Lab 1

PID Control Using Defaults settings of Proportional, Integral, and Derivative Tuning Constants.

Purpose.

Using the default settings of the PID (P = 9%, I = 28 sec, D = 14 sec)controller set in the program:

1) Observe the response of the Control system to a Step change in Set Point.
2) Observe the response of the control system to a disturbance

Procedure

1) Download Arduino IDE and load the code Complete Temperature Control C/C++ Code
2) Make sure 12 VDC power supply plugged in. Connecting the computer USB port to the Arduino Nano will power up the LCD Display and Nano , however the power to the heater requires the 12VDC power supply.
3) On the Arduino IDE menu, go to Tools and click on Serial Plotter. This will open up the serial plotter screen on the PC.
4) Adjust the Set Point Pot to 50 deg C. Wait until steady state.
5) Make a small step increase in Set Point of 5 to 8 C deg. Try to do this in a step wise manner rather than incremental adjusting the Set Point. Record the Set Point
    a. Set Point = _____58 deg C_____
6) Note the peak value of the 1st temperature overshoot and the peak value of the 2nd overshoot and calculate the approximate decay ratio. Observe the response and read the value on the LCD monitor to determine the peak value. Ignore the first overshoot because of the saturation of the controller output.
    a. Peak Value 1st Overshoot (deg C) ____64_____
    b. Peak Value 2nd Overshoot (deg C)_____61_____
    c. Approximate Decay Ratio___(61-58)/(64-58) = ----------0.5 or 50%_____
7) Wait until steady state and then set the Disturbance potentiometer to 50%. Observe the response, noting the maximum drop in temperature and approximately how long the temperature recovers to Set Point of 58 deg C.
    a. Drop in Temperature (C deg)_____(58- 54) = ___4C deg_____
    b. Approximate Recovery Time_____approximately 113 sec_____
    c. Steady state reached in? _____>>500 secs_____